

JAPAN

EDICT OF GOVERNMENT

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JIS B 6509 (1990) (English): Test methods for performance and accuracy of band saw machines and feed equipments

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*The citizens of a nation must
honor the laws of the land.*

Fukuzawa Yukichi

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JAPANESE INDUSTRIAL STANDARD

**Test methods for
performance and accuracy of
band saw machines
and feed equipments**

JIS B 6509—1990

Translated and Published

by

Japanese Standards Association

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

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Test methods for performance and accuracy
of band saw machines and feed equipments

B 6509-1990

1. Scope

This Japanese Industrial Standard specifies the testing methods related to functions, running performances and rigidities and the inspecting methods on accuracies and working accuracies of the band saw machines and caterpillar-feed band saw machines, hereafter referred to as the "band saw machines", and feed equipments (as regards the feed carriages of which effective openings of head block are 500 mm or over to 1500 mm or under) given in Table 1, among the band saw machines of 800 mm or over to 2100 mm or under in saw wheel diameter specified in JIS B 0114.

Table 1. Band Saw Machines

Name of machine
Table band saw machine
Band resaw with rollers
Horizontal band resaw with rollers
Band saw machine with feed carriage
Twin band saw machine

Reference Standards:

JIS B 0905-Balance Quality Requirements of Rigid Rotors

JIS B 6501-Test Code for Performance and Accuracy of Wood Working Machinery

JIS B 7737-Balancing Machines

JIS Z 8203-S1 Units and the Use of their Multiples and of Certain other Units

Remarks 1. The applicable Standards to this Standard are as given in the following:

JIS B 0114 Glossary of Terms for Wood Working Machinery

JIS B 6507 General Code of Safety for Wood Working Machinery

JIS B 6521 Methods of Measurement for Noise Emitted by Wood Working Machinery

JIS B 6605 Safety Standards for Construction of Table Band Resaws

JIS B 6606 Safety Standards for Construction of Band Resaws with Feed Rollers

JIS B 6607 Safety Standards for Construction of Band Saw Machines with Feed Carriages

2. The units and numerical values given in { } in this Standard are based on the traditional unit system and are appended for informative reference.

2. Methods for Functional Tests

The functional tests for the band saw machine and feed equipment shall be in accordance with Table 2.

Table 2. Functional Tests

No.	Test item	Test method
1.	Electric equipment	Before and after the running test, examine the insulating condition once each.
2.	Adjusting operation of band saw	Stretch the band saw and allow the saw wheel to rotate in normal and reverse directions manually to examine the smoothness and reliability of the adjusting device for the stretching force and setting of the band saw.
3.	Operation of straining device of band saw	Examine the smoothness of function, sensitivity and reliability of indication for stretching degree.
4.	Operation of trap device	Examine the smoothness and reliability of the function.
5.	Operation of upper saw wheel tilting device	Allow the saw wheel to start and examine the reliability of the adjusting function for going in and out of tooth tips of band saw.
6.	Operations of start, stop of saw wheel and braking device	Mount the band saw, repeat several times of start and stop operations and allow the braking device to act to examine the smoothness and reliability of actions thereof.
7.	Adjusting operations of ruler	Examine the smoothness and reliability of the adjusting device of the rectangularity of the ruler to the table and the parallelism of the ruler to the feed direction and the adjusting device of sawing width.
8.	Automatic roller feeder	Examine the smoothness and reliability of actions of the holding and feeding of workpiece of the feed roller.
9.	Caterpillar feeder	Examine the smoothness and reliability of the action of caterpillar feeding.
10.	Operation of feeder of horizontal band resaw with roller and operation of positioning of band saw	Examine the smoothness of actions of the feed roller and caterpillar chain type feed and the smoothness and reliability of the adjusting device of sawn material thickness.
11.	Operation of automatic positioning device of twin band saw machine	Set the positions of left and right band saw machines by power feed to examine the smoothness and reliability of its action.

Table 2 (Continued)

No.	Test item	Test method
12.	Operation of automatic offset device of twin band saw machine	Examine the smoothness and reliability of actions whether the carriage or workpiece is not liable to be in contact with the band saws due to widening of interval between the left and right band saws before the carriage retreats and enters between the two band saws.
13.	Operation of travel control equipment of twin band saw machine	Examine the smoothness and reliability of actions on the control of travelling speed being set in accordance with the position of carriage and the control of set stopping position.
14.	Operation of re-ciprocating motion of carriage	Examine the smoothness and reliability of functions of the adjusting device of feed speed, re-ciprocating motion device and off-setting device.
15.	Operation of advancing and re-treating device of head block of carriage	Examine the smoothness of functions and reliability of indications.
16.	Operation of sheeting device	Examine the smoothness and reliability of functions.
17.	Operations of workpiece holding and attaching and detaching	The smoothness and reliability of functions of holding and attaching/detaching of the workpiece of carriage.
18.	Safety device	Examine the reliability of safety function for operator and protecting function for machine (See JIS B 6507, JIS B 6605, JIS B 6606 and JIS B 6607).
19.	Lubricating equipment	Examine the reliability of such functions as oiltightness and adequate distribution of oil quantity.
20.	Oil hydraulic pressure equipment	Examine the reliability of such functions as oiltightness and pressure regulation.
21.	Pneumatic pressure equipment	Examine the reliability of such functions as airtightness and pressure regulation.
22.	Accessories	Examine the reliability of functions

- Remarks 1. The band saw used shall be that recommended by the manufacturer.
2. For a band saw machine which is not provided with the said function, the corresponding test item to this in Table 2 shall be omitted.

3. Methods for Running Tests

3.1 No-load Running Test

3.1.1 Band Saw Machine Continue running and, after the bearing temperature has been stabilized, carry out measurement on respective items specified in the Record Form 1 of Table 3, and observe, at the same time, that no abnormal vibration takes place by the sense of touch.

Furthermore, the measurement of the noise shall be in accordance with JIS B 6521.

Table 3. Record Form 1

No.	Time of measurement	Speed of rotation of main spindle		Temperature °C			Required electric power			Noise	Description
		min ⁻¹ {rpm}		Main spindle bearings		Room temperature	Voltage	Current	Input		
	Hour minute	Marked	Actual measurement	Upper (Left)	Lower (Right)		V	A	kW	dB (A)	

- Remarks 1. For that machine which is equipped with the change gear for speed of rotation of main spindle, record the speeds of rotation at least two levels including the maximum speed of rotation.
2. As regards the conditions for measurement of noise, these shall be recorded in the description column.

3.1.2 Feed Equipment Run the feed equipment respectively at low speed, medium speed and high speed, and observe on the following respective items.

Furthermore, the measurement of the noise shall be in accordance with JIS B 6521.

- (1) Travelling Conditions Presence of abnormality of the smoothness
- (2) Bearing Temperature Stability of bearing temperatures
- (3) Noise Presence of abnormal noise
- (4) Vibration Presence of abnormal vibration

3.2 Load Running Test

3.2.1 Band Saw Machine Carry out the cutting of the specimen, measure on respective items specified in the Record Form 2 of Table 4 and record, and, at the same time, observe that no abnormal vibration takes place and the conditions of cutting faces by the sense of touch.

Furthermore, the measurement of the noise shall be in accordance with JIS B 6521.

In the measurement of the required electric power, carry out testing by changing the sawing width of cutting conditions at a definite feed speed or by changing the feed speed at a definite sawing width of cutting conditions.

Table 4. Record Form 2

No.	Specimen				Tool					Cutting conditions				Required electric power				Description	
	Dimensions		Species of tree or type of timber	Moisture content	Thickness	Width	Pitch	Setting width of teeth	Tooth shape	Speed of rotation of main spindle	Cutting speed	Feed speed	Sawing width	Voltage	Current	Input			
	Length	Thickness x width or diameter														No-load	Loading		Cutting power
mm	mm	%	mm	mm	mm	mm	mm	mm	min^{-1} {rpm}	m/min	m/min	mm	V	A	P_0 kW	P_1 kW	$P_1 - P_0$ kW	Noise dB (A)	
									Appended otherwise										

Remarks 1. As regards the measuring conditions of noise, these shall be recorded in the description column.

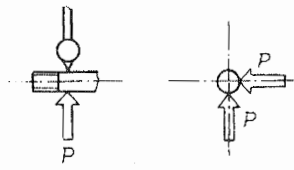
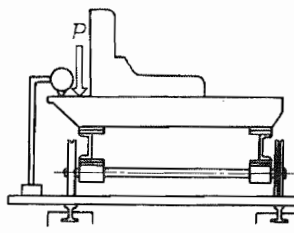
2. The tooth shape shall be illustrated and the main dimensions shall be noted therein.

3.2.2 Feed Equipment Under the loaded condition, carry out the test in accordance with the method of no-load running test of the feed equipment of 3.1.2, as appropriate.

4. Method of Rigidity Test

The rigidity test of the band saw machine and feed equipment shall be in accordance with Table 5.

Table 5. Rigidity Test

No.	Test item	Measuring method	Diagram for measuring method
1	Bending rigidity of main spindle system	Apply a fixed indicator to the tip end (side face) of the main spindle, apply the load (P) in vertical direction to the main spindle ⁽¹⁾ , and measure the deflection of the main spindle. Carry out this measurement in two directions at rightangles with each other, applying the load (P).	
2	Rigidity of carriage	Draw the headblock frontwards as far as possible, put a test indicator on a straightedge which has been allowed to straddle over the flat rail and Vee rail, and apply the tip end of the test indicator to the part of the headblock base face which is the nearest to the part being subjected to the load. In this case, place the straightedge to the nearest part of the nearest wheel to the headblock base being subjected to the load. Apply the load, which is one half the maximum laden mass capable of being loaded on the carriage, to the centre between one of the headblock on the headblock base and the tip end of the base, and measure the relative displacement between the headblock base face and the upper face of the straightedge.	

Note ⁽¹⁾ The position where the load is to be applied shall be the nearer position to the main spindle end as far as possible, and the distance from the main spindle end shall be recorded.

Remarks 1. The rigidity test of the machines of the same design shall be represented by the test results carried out on one representative set, and on others may be omitted.

2. The load (P) shall be of that magnitude recommended by the manufacturer, and its value shall be recorded.

5. Inspecting Method on Accuracies

5.1 Static Accuracy Inspection

5.1.1 Static Accuracy Inspection of Band Saw Machine The static accuracy inspection of the band saw machine shall be in accordance with Table 6.

Table 6. Static Accuracy Inspection of Band Saw Machine

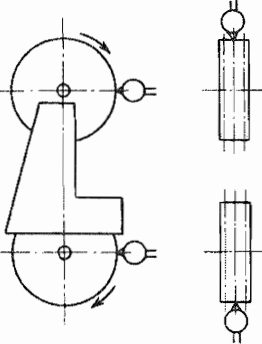
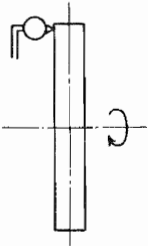
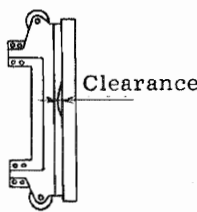
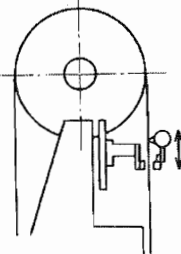
Unit: mm					
No.	Inspection item		Measuring method	Diagram for measuring method	Permissible value
					Diameter of saw wheel
					1200 max. Exceeding 1200
1	Runout of outer peripheral face of saw wheel	Upper saw wheel	Apply a test indicator to the outer-peripheral face of the saw wheel, rotate the saw wheel manually, and obtain the maximum difference of readings of the test indicator during rotation. Furthermore, carry out this measurement at least at three places of the centre and both ends, and consider the largest value among these to be the measured value (2).		0.05 0.07
		Lower saw wheel			0.05 0.07
2	Axial runout of saw wheel	Upper saw wheel	Apply a test indicator to the side face of the outer ring of the saw wheel, rotate saw wheel manually, and consider the maximum difference of readings of the test indicator during rotation to be the measured value.		0.08 0.10
		Lower saw wheel			0.08 0.10
3	Straightness of arch guide	Apply a straightedge in lengthwise direction to the arch guide face, measure clearance with a feeler gauge, and consider the maximum value thereof to be the measured value.		0.05 per 1000	
4	Parallelism of arch guide face to band saw face (3)	Apply the test indicator being attached to the arch arm to the band saw face, allow the arch arm to move up and down, and consider the maximum difference of readings of the test indicator to be the measured value. Carry out this measurement on the longest band saw available.		0.10 per 300	

Table 6 (Continued)

Unit: mm

No.	Inspection item	Measuring method	Diagram for measuring method	Permissible value
				Diameter of saw wheel
				1200 Exceeding max. 1200
5	Parallelism of left and right band saw faces of twin band saw machine	Allow the band saws to stretch, measure the intervals between the left and right saws on cutting side and back side at each two places of upper and lower portions, changing the saw interval, with a vernier calipers, and consider the maximum value of difference (a-b) between the upper and the lower and difference (c-d) between the rear and the front to be the measured value. Carry out this measurement at arbitrary two places, changing the band saw interval, and consider the larger value of these to be the measured value.		0.15 per 300 for parallelism of the upper to the lower 0.05 per 100 for parallelism of the front to the rear
6	Extending accuracy of sheeting device	Set the extending quantity of the sheeting device to a definite value and, at the same time, fix a test indicator at the position so that its tip end touches with the band saw face, and take the quantity of movement due to one operation of the sheeting device. Succeedingly, repeat the same measurements three times or more, and consider the maximum difference of readings to be the measured value.		0.30
7	Perpendicularity of band saw face to upper face of table ⁽³⁾	Apply the square being placed on the upper face of the table to the band saw face, and measure the clearance at its upper part face or lower part face with a feeler gauge. Carry out this measurement on the longest band saw available.		0.05 per 150

Notes ⁽²⁾ As regards the upper saw wheel, measurement shall be carried out by fixing the bearing casing.

Furthermore, for that of which saw wheel outer peripheral face is attached with rubber or the like, it shall be carried out prior to the attachment.

⁽³⁾ The band saw used shall be of fine quality and thicker one, and in measurement the joint part shall be avoided. The stretching force shall generally be 98 MPa {10 kgf/mm²} per sectional area of the band saw.

5.1.2 Static Accuracy Inspection of Feed Equipment The static accuracy inspection of the feed equipment shall be in accordance with Table 7.

Table 7. Static Accuracy Inspection of Feed Equipment

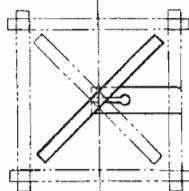
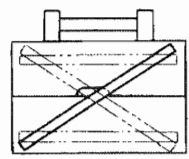
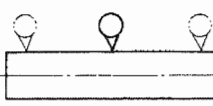
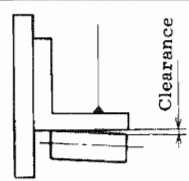
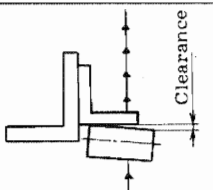
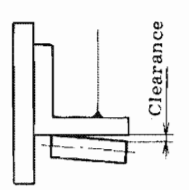
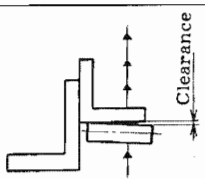
Unit: mm				
No.	Inspection item	Measuring method	Diagram for measuring method	Permissible value
1	Straightness of upper face of table	Place a straightedge on the upper face of the table on both ends longitudinally and laterally, and on diagonal lines, measure the clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.40 per 1000
2	Straightness of ruler face	Apply a straightedge to the upper face and lower face of the ruler face diagonally and in parallel to the table face, measure the clearances with a feeler gauge, and consider the maximum value to be the measured value (*).		0.10 per 300
3	Runout of table roller	Apply a test indicator to the table roller at the centre and both ends, rotate the table roller manually, and consider the maximum difference of readings of the indicator during rotation to be the measured value.		0.10
4	Perpendicularity of table roller to ruler in respect to feed direction	Place a square in the feed direction of the ruler face, apply this to the side face of the table roller, measure clearances with a feeler gauge, and consider the maximum value thereof to be the measured value.		0.50 per 150
5	Perpendicularity of table roller to ruler in respect to vertical direction	Place a square in the vertical direction of the ruler face, apply this to the upper face of the table roller, measure clearances with a feeler gauge, and consider the maximum value thereof to be the measured value.		0.10 per 150
6	Perpendicularity of driving roller to ruler in respect to feed direction	Place a square in the feed direction of the ruler face, apply this to the side face of the driving roller, measure clearances with a feeler gauge, and consider the maximum value thereof to be the measured value.		0.50 per 150
7	Perpendicularity of driving roller to ruler in respect to vertical direction	Place a square in the vertical direction of the ruler face, apply this to the upper face or lower face of the driving roller, measure clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.10 per 150

Table 7 (Continued)

Unit: mm

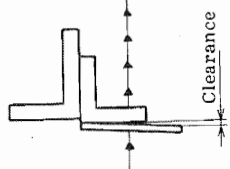
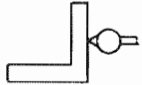
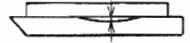
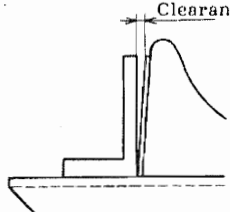
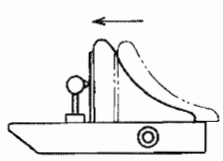
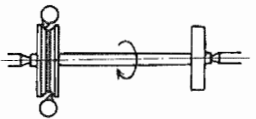
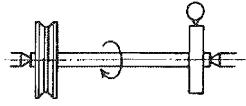
No.	Inspection item	Measuring method	Diagram for measuring method	Permissible value
8	Perpendicularity of caterpillar carriage in respect to ruler	Place a square to the ruler face in vertical direction, and apply this to the upper face of the caterpillar, measure clearances with a feeler gauge, and consider the maximum value thereof to be the measured value.		0.10 per 150
9	Extending accuracy of sheeting device ⁽⁵⁾	Fix a test indicator on a surface plate under a definite set value of the sheeting device, carry out sheetings repeatedly, and consider the maximum difference between the readings of the test indicator and the set value to be the measured value.		0.30
10	Straightness of slide face of headblock	Place a straightedge on the slide face of headblock of the carriage, measure clearances with a feeler gauge, and consider the maximum value thereof to be the measured value.		0.05 per 1000
11	Perpendicularity of headblock	Place a square on the headblock base face of the carriage, apply its vertical face to the headstock face, measure clearances of its upper part face or lower part face with a feeler gauge, and consider the maximum value thereof to be the measured value.		0.15 per 300
12	Extending accuracy of headstock	Set the extending amount of the headstock of the carriage to a definite value, fix a test indicator on each headstock slide face at a distance approximately equal to the extending amount from the headstock face ⁽⁶⁾ , and take the reading of each test indicator when it has gotten in touch with the headstock face by one operation of the headstock. Succeedingly, repeat the same measurement and consider the maximum difference of readings to be the measured value.		0.30
13	Runout of Vee-wheel	Support the both ends of the Vee-wheel of carriage at the centres, apply a test indicator to the inclined face of the Vee-wheel perpendicularly, rotate the wheel manually, and consider the maximum difference of the readings of the test indicator during rotation.		0.07

Table 7 (Continued)

Unit: mm				
No.	Inspection item	Measuring method	Diagram for measuring method	Permissible value
14	Runout of outer-peripheral face of flat wheel	Support the both ends of the flat wheel of carriage at the centre, apply a test indicator to the outer-peripheral face of the flat wheel perpendicularly, rotate the wheel manually, and consider the maximum difference of readings of the test indicator during rotation.		0.05

- Notes (4) In the case where the both end parts of the ruler face are allowed to relieve, these parts are excluded.
 (5) That device having such a function that the ruler which has been attached to the surface plate moves automatically in a definite quantity.
 (6) In positioning, a block gauge generally is used.

5.2 Dynamic Accuracy Inspection The dynamic accuracy inspection of the band saw machine shall be in accordance with Table 8.

Table 8. Dynamic Accuracy Inspection

Unit: mm				
No.	Inspection item	Measuring method	Permissible value	
			Diameter of saw wheel	
			1200 max.	Exceeding 1200
1	Balance quality of saw wheel	<p>Measure the magnitude of unbalance by the dynamic balance tester, obtain the magnitude of specific unbalance from the mass of the saw wheel, and calculate the balance quality from the permissible maximum working speed (7).</p> $\text{Balance quality} = \frac{en}{9.55}$ <p>where e: magnitude of specific unbalance (mm)</p> <p>n: speed of rotation (min^{-1} {rpm})</p>	6.3mm/s	

Note (7) The single plane balancing is employed, and when the dynamic balance test is not available, the magnitude of unbalance may be obtained by the static balance tester.

6. Working Accuracy Inspection

The working accuracy inspection of the band saw machine shall be in accordance with Table 9. However, this inspection shall be executed only in the case where the agreement of execution (between the parties concerned) has been confirmed on documentation at the time of contract.

Table 9. Working Accuracy Inspection

Unit: mm


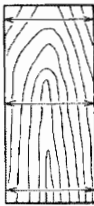
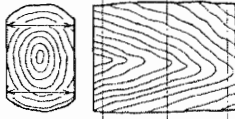
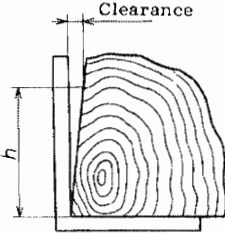

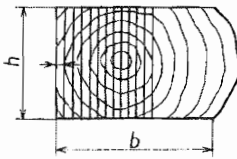
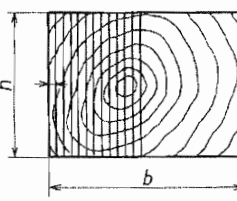
No.	Inspection item	Measuring method	Diagram of measuring method	Dimensions of material	Permissible value
1	Straightness of cutting face ⁽⁸⁾	Stack two sheets of specimen, cut the side faces of lengthwise direction at the same time, cut into 2000 mm each in length as stacked, allow these two sheets of plate to confront each other at the sections which have been cut at the same time, and consider one half the maximum value of clearance thereof to be the measured value.		10 to 20 in thickness 200 to 300 in width	0.50
2	Parallelism of cut face	In horizontal face Fix respective headstocks at equal distance from the tip end of the headblock base, cut one side face of a specimen being attached flat to the headblock and then turn inside out, apply its side to the headstock correctly, cut another side without changing the feed direction, measure the width at least at the centre and both ends, and consider the maximum difference thereof to be the measured value.		10 to 20 in thickness 200 to 300 in width	0.30 per 1000 in length
		In vertical face After one face of a specimen has been cut, apply its cut face to the headstock correctly, cut the opposite face without changing the feed direction, obtain the difference of the thicknesses of the upper and lower parts at the centre and both ends of the feed direction, and consider the maximum difference thereof to be the measured value.		Round timber of 300 or over in diameter	0.50 per 300 in sawing width
3	Perpendicularity of square sawing ⁽⁸⁾	Table type equipment Cut one face of a specimen, place its face on the upper face of the table and cut another face, and measure the squareness of its cut face to the base face. In measuring the squareness, apply a square to the rectangular face, measure the maximum clearance of upper part or lower part at the position of the measuring distance h from the vertex with a feeler gauge, and consider this to be the measured value.		Material of 150 or over in sawing width of one face	0.15 per 150 in measuring distance h
		Carriage type Cut two faces of a specimen rectangularly, and measure its squareness at the centre part and both ends. In measuring the squareness, apply a square to the rectangular face, measure the maximum clearance of the upper part or lower part at the position of the measuring distance h from the vertex with a feeler gauge, and take it as the measured value.		Round timber of 300 or over in diameter	0.30 per 300 in measuring distance h

Table 9 (Continued)

Unit: mm

No.	Inspection item	Measuring method	Diagram of measuring method	Dimensions of material	Permissible value
4	Table type equipment	Set the aperture of the ruler as a definite value, and consider the maximum difference of thicknesses at the front ends of respective plates being cut continuously to be the measured value. However, the thickness of the plate shall be 6 mm or over, number of sheets of continuous cutting shall be 12 sheets and the measuring position shall be the centre of plate width.		Section: 150 or over in sawing width h, 200 or over in width b, approx. 2000 in length, and that has been preprocessed of 3 faces in longitudinal direction	0.30
	Carriage type	Extend out the headstock each in definite amount by the same sheeting operation, and consider the maximum difference of thicknesses at the front ends of respective plates which have been cut continuously to be the measured value. However, the thickness of the plate shall be 6 mm or over, number of plates of continuous cutting shall be 12 sheets, and the measuring position, be the centre of plate width.		Section: 200 or over in sawing width h, 250 or over in width b	0.50

Note ⁽⁸⁾ This does not apply to the horizontal band resaw with rollers.

- Remarks 1. This inspection shall not be that for guaranteeing the accuracy of sawmill products, but for guaranteeing the working accuracy of the band saw machine (feed equipment), so that the tools, specimens and cutting conditions shall all be selected by the manufacturer, and be executed by the manufacturer himself.
2. The cutting conditions, specimens and tools shall be recorded, together with the measured results, in the Record Form 3 of Table 10.
3. For a band saw machine which is not provided with the said function, the corresponding inspection items in Table 9 are omitted.

Table 10. Record Form 3

Inspection item number	Specimen			Tool				Cutting conditions				Measured results	
	Length mm	Thickness x width or diameter mm	Species of tree or type of timber	Moisture content %	Thickness mm	Width mm	Pitch mm	Setting width of teeth mm	Tooth shape Appended otherwise	Speed of rota- tion of main spindle min^{-1} {rpm}	Cutting speed m/ min		Feed speed m/ min

Remarks: The tooth shape shall be illustrated and main dimensions, noted.

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